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NASA Procedural Requirements

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(NASA Only)

Subject: Technical Probabilistic Risk Assessment (PRA) Procedures for Safety and Mission Success for NASA Programs and Projects

Responsible Office: Office of Safety and Mission Assurance

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Chapter 4. Roles and Responsibilities

4.1 Overview

4.1.1 NPD 8700.1, NASA Policy for Safety and Mission Success, states that Mission Directorate Associate Administrators, Center Directors, and program/project managers are responsible for assuring that appropriate Agency safety, health, reliability, maintainability, quality, and risk management policies, plans, techniques, procedures, and standards are implemented. This chapter outlines specific responsibilities with regard to PRA.

4.2 Mission Directorate Associate Administrators

4.2.1 Mission Directorate Associate Administrators shall:

- a. Ensure that applicable programs and projects conduct a PRA in accordance with this NPR ([Requirement 69298](#)).
- b. Ensure that PRA results are available and used for informing Agency risk management applications and program/project technical reviews ([Requirement 69299](#)).
- c. Ensure that adequate resources (funding, personnel, methods, data, and software applications) are made available for PRA ([Requirement 69300](#)).
- d. Ensure that formal PRA awareness and methodology training are provided periodically

to managers, practitioners, and contractors ([Requirement 69301](#)).

4.3 Chief, Safety and Mission Assurance

4.3.1 The Chief, Safety and Mission Assurance shall:

a. Develop and maintain NASA PRA policy, procedures, and guidelines and assure their correct implementation at Headquarters and at the Centers ([Requirement 69304](#)).

b. Provide corporate and functional leadership, mentoring, technical direction, and consultation on PRA methodology (on how to conduct a PRA), PRA tools, and oversight Agency wide ([Requirement 69305](#)). These responsibilities include:

(1) Establishing a mechanism for the exchange of PRA-related information (program/project PRA models, data, reports, and peer review results), methodology, best practices, computer applications, training, and lessons learned across programs/projects, Centers, Government agencies, and international partners ([Requirement 69306](#)).

(2) Assuring that PRA is adequately planned and conducted and utilizes a valid technical approach and data to support risk management activities ([Requirement 69307](#)).

(3) Assisting the Center SMA Directors in their review and approval of program/project PRA plans, when requested ([Requirement 69308](#)).

4.4 Center Directors

4.4.1 Center Directors shall ensure that their SMA and Engineering organizations acquire, maintain, and utilize the appropriate expertise to conduct a PRA and support Center-based PRA programs/projects ([Requirement 69310](#)).

4.5 Center Safety and Mission Assurance (SMA) Directors

4.5.1 Center SMA Directors shall:

a. Approve or provide upon request by the program/project manager, a PRA lead with experience and demonstrated technical competence in the conduct and application of PRAs for each Center-hosted program/project PRA ([Requirement 69313](#)).

b. Concur on Center-hosted program/project PRA plans ([Requirement 69314](#)).

c. Transmit the program/project PRA plan to OSMA prior to conducting the PRA ([Requirement 69315](#)).

4.6 Program/Project Managers

4.6.1 Program/project managers shall:

a. Ensure that adequate funding for the scope and application of the PRA documented in the approved PRA plan is properly included in the program/project budget to support an IPR, as required ([Requirement 691318](#)).

Note: Decisions on when to conduct an IPR of the PRA are based on program/project complexity, consequence severity, cost, visibility, potential risk, and the key decisions being supported by the PRA at the various technical reviews (See Chapter 5).

b. Approve of the PRA plan contained in the program/project risk management plan or other program/project planning documentation developed by the PRA lead (e.g., PRA plan, program plan, reliability and maintainability plan) ([Requirement 69319](#)).

; (See Paragraph 3.3.2.)

c. Inform and obtain approval of the program/project PRA plan from the host Center SMA Director for program/project Level 2 (NASA Center-level program management) requirements and implementation plans ([Requirement 69321](#)).

d. Ensure the results and documentation of the PRA are in accordance with the requirements described in Chapter 2 of this NPR and satisfy the program/project scope and objectives as documented in the approved PRA plan ([Requirement 69322](#)).

e. Ensure that program/project implementation procedures reflect and incorporate the use of PRA results (including uncertainty) in accordance with the project scope and objectives documented in the approved PRA plan to:

(1) Support RIDM, including the development of performance measures and requirements and continuous risk management ([Requirement 69324](#)).

(2) Identify recommended controls (preventive and mitigating features, compensatory measures) needed to reduce and manage risks ([Requirement 69325](#)).

(3) Update design, operating, implementation, and maintenance plans biannually to reflect insights from PRA ([Requirement 69326](#)).

f. Reduce program/project risk to an acceptable level if the residual risk, as shown through the use of PRA, is deemed unacceptable as defined by program/project requirements documented in the approved PRA plan ([Requirement 69327](#)).

Note: Residual risk is defined as the risk that remains or is introduced following the implementation of prevention and mitigation measures and controls.

g. Ensure that the PRA has internal reviews in order to enhance its quality and credibility and to assure consistency with the requirements of this NPR and the approved PRA plan ([Requirement 69329](#)).

h. Ensure that all PRA inputs, products, models, analyses, and documentation are made readily available for IPRs consistent with the objectives and applications defined in the approved PRA plan ([Requirement 691330](#)).

i. Consistent with the objectives and applications defined in the approved PRA plan, ensure that contracts for PRAs:

(1) Are supported by reliability and maintainability and system safety analyses ([Requirement 69332](#)).

(2) Are properly represented in procurement documents (e.g., requests for proposals, proposals, review criteria, statements of work, procurement plans) to be consistent with

program/project level PRA models ([Requirement 69333](#)).

(3) Have PRA requirements from this NPR flowed down including the availability of functional, safety and health, reliability, and risk models, analyses, and relevant data ([Requirement 69334](#)).

(4) Include a schedule with interface deliverables commensurate with the requirements of Paragraph 4.6.1.e and 4.6.1.f ([Requirement 69335](#)).

4.7 Program/Project PRA Lead

4.7.1 Program/project PRA leads shall:

a. Establish a qualified multidisciplinary PRA team to conduct the PRA ([Requirement 69338](#)) in accordance with this NPR and the approved PRA plan, including:

(1) The selection of qualified individuals, with appropriate PRA training, experience, and expertise, that are knowledgeable about the program/project being assessed and the PRA requirements discussed in Chapters 2 and 3 of this NPR.

(2) Representatives from key program/project functional elements (e.g., design, engineering, operation including crew operation, system safety, and maintenance).

(3) Participation, input, and review from appropriate NASA organizations.

b. Ensure that PRA models, results, data, and supporting documentation are baselined for each technical review and are under configuration control, consistent with the scope and objectives of the approved PRA plan ([Requirement 69342](#)).

Note: The maintenance and safeguarding of records resulting from PRAs is conducted in accordance with NPR 1441.1, NASA Records Retention Schedule.

c. Provide PRA results and documentation to support and inform internal and external technical reviews in accordance with the project scope and objectives documented in the approved PRA plan ([Requirement 69344](#)).

d. For PRAs that provide input to other PRAs either at a higher level or for other program/project elements, ensure that the PRA assumptions, models, quantification, and terminology are documented and consistent with the PRAs supported ([Requirement 69345](#)).

e. Ensure that the PRA is consistent with and supported by system safety analyses and reliability, availability, and maintainability analyses ([Requirement 69346](#)).

4.8 SMA Technical Authority

a. The SMA Technical Authority shall have the authority to concur or nonconcur in the determination by the program manager that a PRA is not necessary for: (i) Priority Ranking II programs/projects as identified in Chapter 2 of NPR 8715.3, NASA General Safety Program Requirements; and (ii) payloads with a risk classification level of B, as defined in NPR 8705.4, Risk Classification for NASA Payloads ([Requirement 69348](#)).

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